

a leaden bob attached at its centre of gravity. Thus the expansion of the zinc tube compensates those of the steel rod and tube, the coefficient for zinc being, as is well known, nearly three times that for steel. This construction has also been applied with great success to the principal clocks intended for the Transit of *Venus* expeditions. In the Normal Sidereal clock there is also a very delicate means of making the final adjustment for compensation, but no necessity has yet arisen for trying this. The very slight changes of rate observed in the clock appear to take place very gradually and to have no connexion with temperature. As yet there are hardly sufficient data to establish their dependence on atmospheric pressure; but it seems that every considerable rise or fall of the barometer is accompanied by a corresponding increase or decrease of the losing rate.

Radcliffe Observatory, Oxford.

No change worth mentioning has taken place in the personal establishment or in the operations of the Radcliffe Observatory during the past year. The amount of work which has been performed both in the astronomical and the meteorological departments is nearly the same as that of the preceding year, and the reductions are kept up to almost the same state of forwardness, though, with every possible exertion, it is found impossible to gain much advance, either in the reductions or the printing. The greater portion of the astronomical part of the volume for 1869 is printed; and it is hoped that a few copies of the Catalogue of Stars for that year, amounting in number to nearly 1500, will be ready in a very short time. During that year, and those which have followed it, great attention has been paid to daylight observations of stars, and it may be mentioned that the rate of the transit-clock (since a little more mercury was put into the cylinders in 1868) has been exceedingly uniform. There is no difference throughout the year which can be attributed to temperature; and the slight deviations from uniformity, which are generally not of the nature of bad going or casual irregularity, afford scope for some interesting speculations.

It may be considered now that the materials for the Third Radcliffe catalogue are complete, and Mr. Main purposes to take in hand the compilation of it as soon as it is possible, with due regard to the progress of ordinary work, combining the observations of all stars from 1862 to 1871, both years inclusive. The weather during a great portion of the year has not been favourable to observations with the Heliometer, though a considerable number of double stars have been observed in the short intervals of fine weather. It may finally be mentioned that, commencing with October last, thirteen occultations of stars by the Moon have been observed, the greater number being at very low

altitudes, and therefore being available for the correction of the Moon's parallax.

Cambridge Observatory.

The new Transit Circle has been chiefly employed in determining the places of small stars in the zone lying between 25° and 30° of North Declination, a work which has been undertaken by this Observatory with the view of assisting in carrying out the plan formed by the German Astronomical Society for observing all the stars, to the ninth magnitude inclusive, contained in Argelander's *Durchmusterung des nördlichen Himmels*.

Upwards of 4,500 of these stars have been observed, and their true North Polar Distances accurately calculated.

All the instrumental and clock corrections have been obtained, and are ready to be applied for finding the Right Ascensions, as soon as the reductions to the centre wire, now in progress, are completed. These observations were taken with the instrument clamped in a fixed position, the bisections being made by means of the micrometer, and each star was observed at three of the vertical wires. In this way the stars within a range of about $10'$ in declination could be conveniently and rapidly observed. The circle readings were taken at the beginning and end of each set of observations, and were found to remain remarkably constant. The optical power of the instrument is so great, that stars down to the tenth magnitude can be observed, and consequently, in the mode of observation just described, many more stars were taken than were required in order to carry out the plan laid down by the German Astronomical Society. Accordingly, the plan of observation has been lately modified, so as to make it conform more closely to the programme of the Society, and Mr. Simms has made a few alterations in the instrument which have rendered it more suitable for the class of observations required.

The bisection of a star with a single declination wire was found to interfere seriously with the right-ascension observations, so that in the case of very small stars it was found necessary to complete the right-ascension observations before the bisection was made. In order to remedy this, the single wire has been replaced by two parallel wires, $10''$ apart; and two similar pairs of wires have been added, each at the distance of about $5'$ from the central pair, to give increased facility of bisection in particular cases.

The tangent screw handles have been made more accessible to the observers, one being under the control of the assistant who reads the microscopes, and enabling him to set the instrument with great rapidity within a range of more than half a degree; the other is controlled by the right-ascension observer who makes the bisection.

Mr. Graham has adopted a method of determining the intervals